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(54) Damping and positioning device for a sliding door

(57) Damping and positioning device for a sliding door (1), said device comprising an obliquely extending leaf spring (17) having its one end (15) fixedly connected to the building structure (9) along which the sliding door is movable. Said sliding door has a braking member (6) contacting the leaf spring (17) when the sliding door reaches an end position. The leaf spring is in a plane enclosing a small angle with the horizontal plane. The secured end (15) of the leaf spring (17) lies lower than the free end (19). On movement of the sliding door towards an end position, the braking member (6) connected to the door will first contact the free end (19) of the leaf spring. Near its secured end (15), the leaf spring is provided with an upwardly curved portion (21) in which the braking member (6) can be received. A second leaf spring (18) can be mounted underneath the first one.

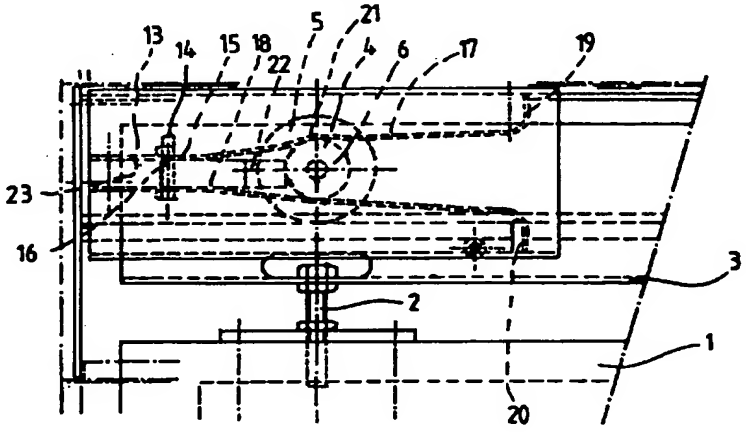

FIG. 1

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Description

The invention relates to a damping and positioning device for a sliding door, said device comprising at least one leaf spring having its one end directly or indirectly fixedly connected to a part of the building structure along which the sliding door is movable, and from said end enclosing an oblique angle with the direction of movement of the sliding door, said sliding door being provided with a braking member being able to contact the leaf spring on movement of the sliding door.

Such a device is known from EP-A-0443303. With this device, two leaf springs are used, extending towards each other from their securend ends in such a way, that the free ends remain at some distance from each other. At their secured ends, the leaf springs are directed obliquely in such a way, and are bent at their free ends in such a way, that a braking member in the form of a roller connected to the sliding door can move along a leaf spring and then contact the obliquely extending portion of the spring so that the door is braked. After the roller has passed the free, bent end of said leaf spring, it is accommodated in the cavity between the free ends of both leaf springs.

It will be obvious, that there is a chance that the roller, after the first leaf spring has passed, will not be accommodated in the cavity, but moves further along the other leaf spring. This can occur e.g. when an excessive force is exerted on the door. When, in order to prevent the roller from not being accommodated in the cavity, the force exerted on the roller by the spring will be enhanced, easy movement of the door will be counteracted.

When, on movement of the door, its braking member contacts a leaf spring, the door will be braked at its upper end. Due to the moving mass of the further part of the door, a tilting movement will be exerted onto the door, as a consequence of which the upper end contacting the leaf spring will tend to move upwards. Owing to this, there is a chance that the door will run out of the rails. In any case, larger loads than usual will be exerted on the rail structure.

Some users open a sliding door by bringing it into movement with a jerk. On application of the known device, there is a chance of the sliding door coming to a stop against one of the head jambs with a considerable force.

The object of the invention is to remove these difficulties and to that end provides for, that a first leaf spring is mounted in such a way that it is substantially in a plane enclosing a small angle with the horizontal plane, with the secured end of the leaf spring lying lower than the free end so that, on movement of the sliding door towards its end position, the braking member connected to the door will first contact the lower plane of the free end of the leaf spring and then, on further movement towards the secured end of the leaf spring, will be pushed down by the leaf spring, with the leaf spring near its secured end being provided with an upwardly curved portion in which the braking member can be received when the sliding door reaches the end position concerned.

By said way of arranging the leaf spring, it is provided for that during braking, the upper end of the sliding door is pushed down so that a tilting movement of the sliding door is largely prevented. Undesired moving back of the sliding door by the action of the leaf spring is counteracted in that the braking member is received in the curved portion of the leaf spring.

According to a further development of the invention, a resilient impact member, such as from rubber, is mounted near the secured end of the leaf spring, said impact member being contactable with the brake member of the sliding door at the end of the path of movement of the sliding door.

Application of the impact member provides for, that also the last amount of kinetic energy that might still be present in the sliding door, is accomodated and nullified. In this case, undesired moving back of the sliding door due to the fact that it contacts the resilient impact member is likewise counteracted in that the braking member is incorporated in the curved portion of the leaf spring.

According to a development of the invention, a second leaf spring can be mounted, enclosing an angle with the first leaf spring in such a way, that the braking member connected to the sliding door can be received between both springs.

The first leaf spring is maintained unmodified. Such a possibility can e.g. be used when stronger braking of the door is desired, or when applying a door having a greater mass and thus being able to contain more kinetic energy. The point where the door is applied or its way of operating can also play a part. In any case, the second spring will be arranged such, that on braking the door, a downward force will be exerted on the door.

A simple construction can be achieved when a spring is secured to a flat mounting strip being directly or indirectly connected to the building structure and substantially extending in the horizontal plane and carrying the impact member too.

When applying two springs, one will lie against the upper plane and the other against the lower plane of the mounting strip.

Means for adjusting the force with which a spring will contact the braking member can be provided for. These means can be in the shape of e.g. washers which are mounted between the mounting strip and the spring concerned. Owing to this, again one type of spring can be used for various purposes. Obviously, other means, such as set screws, can be used as well.

According to a development of the invention, it can be provided for, that the braking member is connected to the door by means of the pin carrying a runner of a sliding door suspended from a rail.

Then, no other parts than those already present in most cases need be connected to the door.

Further, it should be stated that, contrary to the device according to the present invention, the known

device can be mounted at any desired point of the path of movement of a sliding door. Generally, this will hardly ever be realized and the device will only be applied at both end positions of the sliding door.

The invention is further explained by way of an embodiment shown in the drawing, in which:

Fig. 1 shows a view of part of a sliding door with the rail from which it is suspended and with the damping and positioning device according to the invention; and
Fig. 2 shows an end view of the structure of Fig. 1.

The figures show part of a sliding door 1 being connected to a corner piece 3 by means of bolts 2, said corner piece carrying at its ends, of which only one is shown, a pin 4 on which the runner 5 is situated at one side, and the braking member 6 at the other.

The runners 5 are supported by a rail 7 secured to the building structure 9 by means of bolts 8. The door can be adjusted to the desired height by means of the bolts 2. The bolt 10 provides for that the door can not be simply lifted from the rail 7.

Through the bolt 11, a cover 12 carrying the strip 13 is fastened to the rail 7. The ends 15 and 16 of the upper leaf spring 17 and the lower leaf spring 18, respectively, have been fastened to the strip 13 by means of the bolt 14. The free ends 19 and 20 of the leaf springs 17 and 18, respectively are provided with a bent portion. The upper leaf spring 17 is provided with a curved portion 21 in which the braking member 6 can be received. The strip 13 further carries the impact member 22 made of rubber, for example.

As mentioned above, the force exerted on the braking member by the springs 17 and 18 can be reduced by applying filling plates 23 between the strip 13 and the spring concerned. It will be provided for, that the spring 17 will exert a downward force on the door whenever the door is braked.

As appears from the above, the braking member 6 can be connected to the door 1 in a simple way. The cover 12 with the mounting strip 13 and the leaf springs 17 and 18 can be connected to the rail 7 in a simple way. Owing to this, an easily mountable braking device has been obtained.

It will be obvious, that only one possible embodiment of a device according to the invention has been illustrated in the drawing and described above and that many changes can be made without leaving the inventive idea.

Claims

1. Damping and positioning device for a sliding door (1), said device comprising at least one leaf spring (17) having its one end (15) directly or indirectly fixedly connected to a part (13, 7) of the building structure (9) along which the sliding door is movable, and from said end enclosing an oblique angle with the direction of movement of the sliding door (1), said sliding door being provided with a braking member (6) being able to contact the leaf spring (17) on movement of the sliding door, characterized in that a first leaf spring (17) is mounted in such a way that it is substantially in a plane enclosing a small angle with the horizontal plane, with the secured end (15) of the leaf spring (17) lying lower than the free end (19) so that, on movement of the sliding door towards its end position, the braking member (6) connected to the door will first contact the lower plane of the free end of the leaf spring (17) and then, on further movement towards the secured end (15) of the leaf spring (17), will be pushed down by the leaf spring, with the leaf spring near its secured end (15) being provided with an upwardly curved portion (21) in which the braking member (6) can be received when the sliding door reaches the end position concerned.

2. Device according to claim 1, characterized in that a resilient impact member (22), such as from rubber, is mounted near the secured end (15) of the leaf spring (17), said impact member being contactable with the brake member (6) of the sliding door (1) at the end of the path of movement of the sliding door.

3. Device according to claim 1 or 2, characterized in that a second leaf spring (18) is mounted, enclosing an angle with the first leaf spring (17) in such a way, that the braking member (6) connected to the sliding door (1) can be received between both springs (17, 18).

4. Device according to one of the preceding claims, characterized in that a leaf spring (17, 18) is secured to a flat mounting strip (13) being directly or indirectly connected to the building structure (19) and substantially extending in the horizontal plane and carrying the impact member (22) too.

5. Device according to one of the preceding claims, characterized in that means are provided for adjusting the force with which a spring (17, 18) will contact the braking member (6).

6. Device according to claim 5, characterized in that the means are in the shape of washers (23) which are mounted between the mounting strip (13) and the spring (17, 18) concerned.

7. Device according to one of the preceding claims, characterized in that the braking member (6) is connected to the door (1) by means of the pin (4) carrying a runner (5) of a sliding door suspended from a rail (7).

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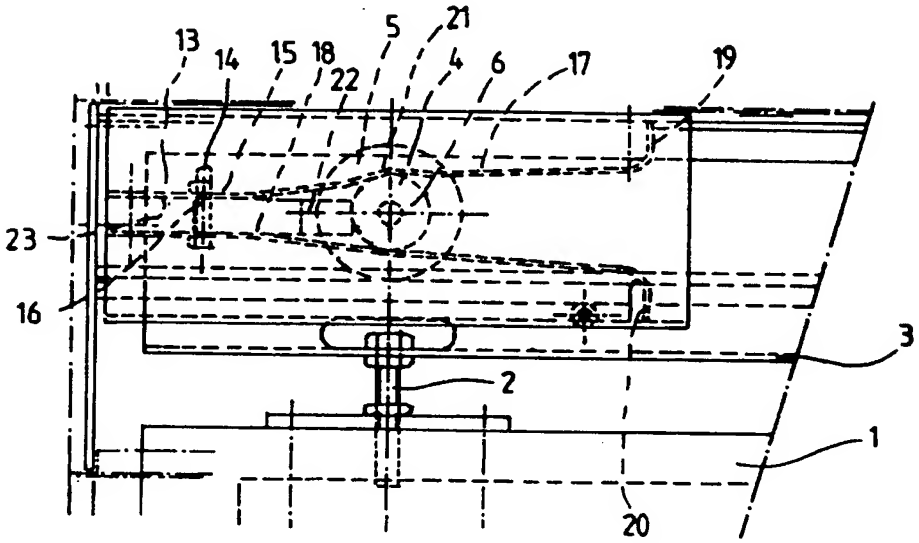

FIG. 1

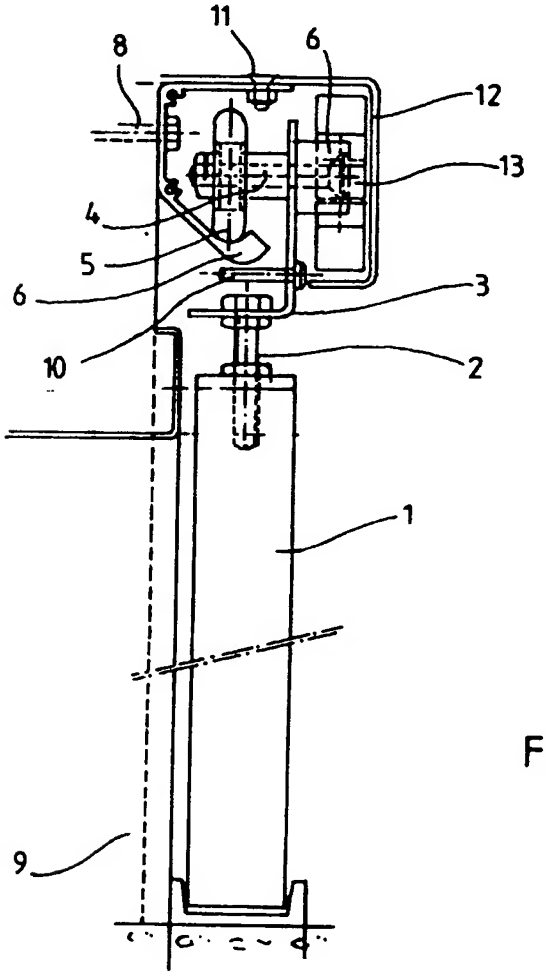

FIG. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 96 20 0002

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	CH-A-657 415 (HAAB ET AL) 29 August 1986 * page 2, right-hand column, line 43 - page 3, right-hand column, line 9; figures 1-4 *	1,2,5,7	E05D13/00 E05F5/00
A	DE-U-84 05 712 (JOSEF GARTNER & CO) 25 July 1985 * page 7, last paragraph - page 8, paragraph 1; figures 12-15 *	1-3	
A	EP-A-0 626 495 (KLEIN IBERICA, S.A.) 30 November 1994 * column 5, line 37 - line 57; figures 2-4 *	1,4	
A	EP-A-0 495 498 (HÖRMANN KG AMSHAUSEN) 22 July 1992 * page 3, line 42 - page 4, line 11; figures 1,2 *	1,2	
D,A	EP-A-0 443 303 (LUMINATOR AB) 28 August 1991 * abstract; figures 1-3 *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.6) E05D E05F E05C
A	GB-A-874 661 (HALLEM, SLEIGH & CHESTON LTD) 10 August 1961 * page 2, line 122 - line 125; figure 3 *	3	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 July 1996	Van Kessel, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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